

Mustard Production and Distribution in Rajasthan

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ABSTRACT

The major mustard growing states in India are Rajasthan, followed by Uttar Pradesh (UP), Haryana, Madhya Pradesh, Gujarat and West Bengal.

Recently, National Mission on Oilseeds and Oil Palm (NMOOP) was introduced with a vision to boost production of vegetable oils sourced from oilseeds and various other initiatives have been adopted to increase oilseed production including, mustard in India to meet domestic demand.

In recent years, mustard consumption has been increasing, leading to increased demand in global as well as domestic markets.

In Rajasthan, Alwar takes the lead as the major producing district followed by Shri Ganganagar, Bharatpur, Tonk, Sawai Madhopur, Baran and Hanumangarh.

In the state, key mustard sowing period varies from 2nd week of October to the 1st week of November. Basically, mustard seed crop enjoys proper germination when soil starts containing moisture and the average temperature is 28 degree celcius.

On the other hand, Mustard Research Centre, Bharatpur, also came out with new varieties of research seed in the farm level to increase yield rate of mustard in the state to enhance production.

Further, irrigation facility is also very supportive in the state, while on an average 90% mustard growing area is facilitated by irrigation (DES, MoA).

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KEYWORDS: mustard production, distribution, Rajasthan, research, yield, crop, season, rains

INTRODUCTION

Additionally, daily weather forecasting is available on the website of Agriculture Meteorology Division provided through Gramin Krishi Mausam Seva in an attempt to provide proper guidance to farmer's during crop sowing, irrigation period, incidence and types of pest attacks and harvesting period.

As a result of the various efforts taken up by the Central as well as state government, estimated production of mustard in Rajasthan is likely to increase in the upcoming season 2015-16.[1]

Table 1: Estimated Mustard Production for Rajasthan In 2015-16

Districts	2014-15			2015-16 estimated			Variation from Previous Year (%)		
	Area ¹	Production	Yield ²	Area ¹	Production	Yield ²	Area	Production	Yield
Alwar	230.66	299.86	1300	207.59	301.01	1450	-10	0.38	11.54
Ganganag	193.62	271.07	1400	199.43	329.06	1650	3	21.39	17.86
Bharatpur	196.52	294.77	1500	190	351.5	1850	-3.32	19.24	23.33
Tonk	299.07	269.16	900	284.11	227.29	800	-5	-15.56	-11.11
Sawai ma	185.01	228.48	1235	181.16	217.39	1200	-2.08	-4.86	-2.83
Baran	73.34	110.01	1500	77	123.21	1600	5	12	6.67
Hanumang	95.64	146.33	1530	100.54	165.9	1650	5.13	13.38	7.84
Other dist	1159.94	1275.93	1100	1143.42	1657.96	1450	-1.42	29.94	31.82
State total	2433.78	2895.6	1190	2383.26	3373.31	1415	-2.08	16.5	18.97
(Area *000 Hectare, Production *000 tonnes and Yield kg/ha)									

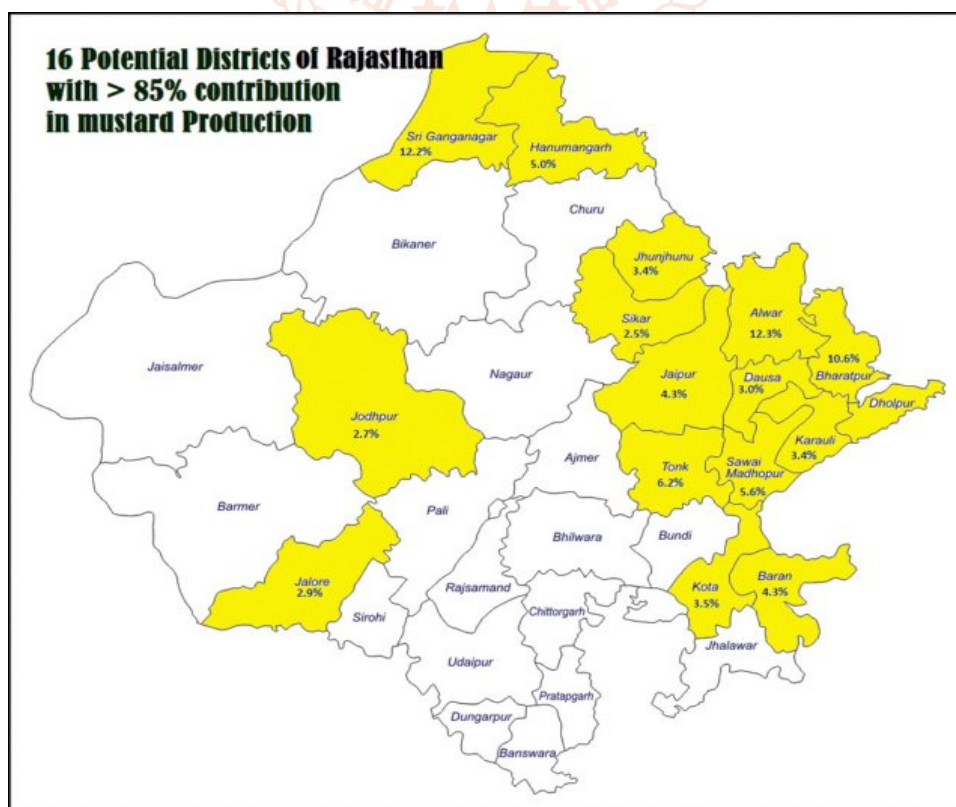
The estimation has been prepared on the basis of a brief telephonic survey conducted by CommoditiesControl.com of various traders, agro-processing companies, district concerned KVK (Krishi Vigyan Kendra) scientists and farmers.

The highlight of our interview is increase/decrease in area under mustard cultivation as previous years, sowing and harvesting period of the crop, weather condition during the overall growing season, irrigation facility, incidence of pest attacks and expected yield rate for during 2015-16.



From the interview, the following conclusions can be drawn with the help of Table 1.

1. In Rajasthan, overall area under mustard cultivation is showing a decline of over 2% during the season, but production is expected to increase 16.50% due to increase in expected yield rate by 18.97%. [2,3]
2. Though the survey found that in Alwar district, area under mustard is likely to fall 10%, surprisingly production may increase 0.38%. Dr. Pankaj Sharma (PC, KVK, Alwar) is of the opinion that even as area may fall short by 10% this season, the district is likely to witness increased production helped by favorable weather conditions during flowering and growing period.
3. In Shri Ganganagar district, production is expected to surge up 21.39% in 2015-16 compared to the previous year. This year, area under mustard cultivation increased in the district and yield is expected to increase 17.86%, leading to increased production. According to Shri Vijay Singla (Trader, Shri Ganganagar), "We are expecting an increased mustard production this year, as weather was very supportive till date and if it remains same till harvesting period, production will definitely see a rise."



4. In Tonk and Sawai Madhopur districts, expected production figures are likely to fall 15.56% and 4.86% respectively. The survey suggested that due to increasing temperature, sown area under mustard shrank. Farmers were concerned about crop failure, therefore lackluster cultivation this season compared to 2014-15. In the words of Dr. Sushil Sharma (PC, KVK, Tonk), "Yield rate is likely to decrease in the regions due to insufficient rainfall, long term dry spell during germination period and increase in temperature in January.
5. In districts of Baran and Hanumangarh, production is estimated to increase 12% and 13.38% respectively. In both the districts, weather conditions have been favorable for mustard cultivation this season.[4,5]

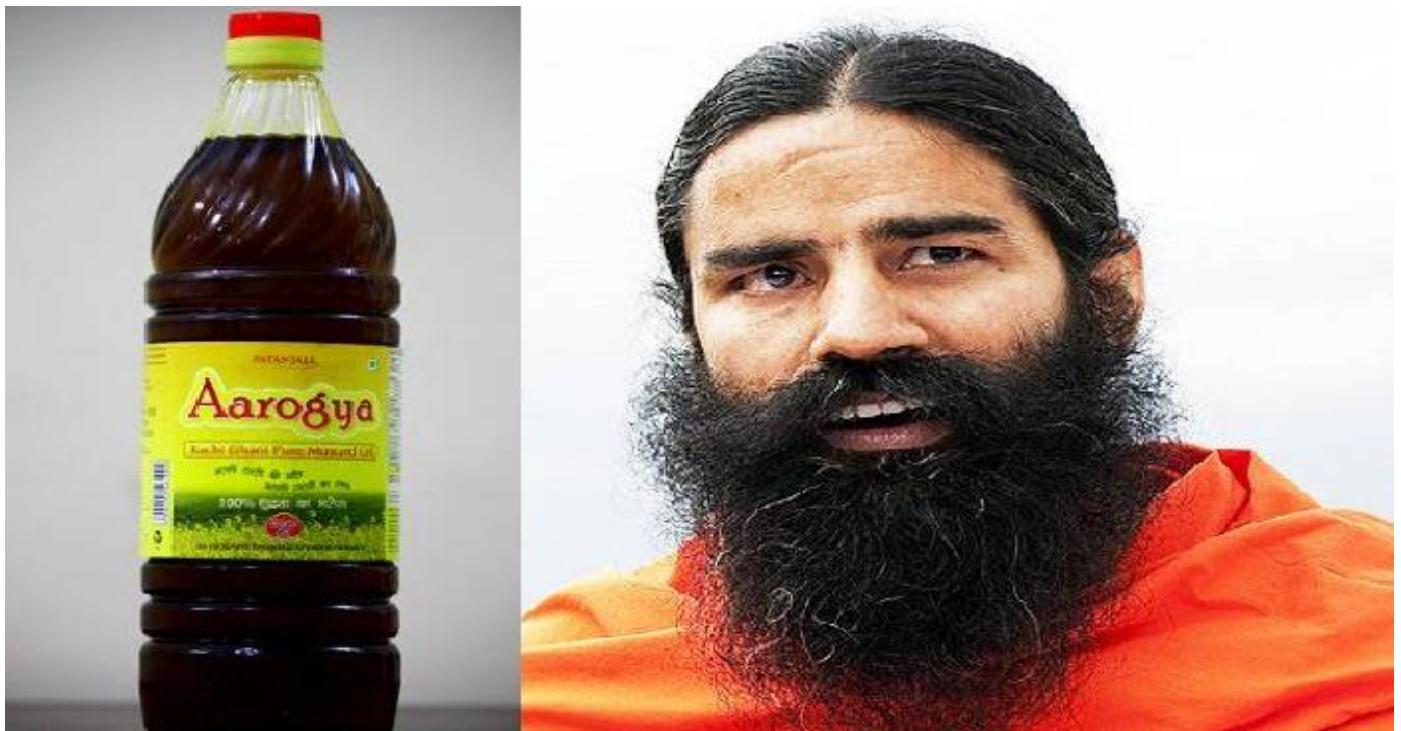
DISCUSSION

Rapeseed-mustard (*Brassica* species) is the major rabi oilseed crop of India. Mustard seed is the second most important oil seed crop in India after soyabean accounting for nearly 20- 22% of the total oilseeds produced in the country. India is the fourth producer of mustard seed contributing to around 11 % of world's total production.



Rajasthan is the most giant mustard growing state and alone contributes 43% of the total mustard seed production in India (Mustard crop Survey Report 2014-15). In Rajasthan, the mustard crop is mostly cultivated in Alwar, Bharatpur, Jaipur, Dholpur, Sawaimadhopur, Sriganganagar, Jhunjhunu & Sikar districts. Bharatpur, eastern district of Rajasthan is the largest mustard growing division covering about 48 per cent of the total production of state. Therefore a study was carried out to assess the trend in area, production and yield of mustard crop in Bharatpur region of Rajasthan. Secondary data were compiled for the period 2001-02 to 2014-15 from various published sources and websites. The area, production and yield of mustard crop in Bharatpur region has been witnessing an increasing trend since 2001-2013 decade due to increasing usage of RM seed oil in food. Moreover, strong domestic demand for mustard seed oil was also one of the reasons for rise in production. During 2013-15 mustard crop shows decreasing trends in terms of area, production and productivity due to unfavorable weather conditions.[6,7]

In Rajasthan state, the mustard crop is mostly cultivated in Alwar, Bharatpur, Jaipur, Dholpur, Sawaimadhopur, Sriganganagar, Jhunjhunu & Sikar districts. Bharatpur, eastern district of Rajasthan is the largest mustard growing division covering about 48 per cent of the total production of state. Indian mustard crop plays a vital role in improving economic status of the farming community of Bharatpur region. Oilseed crops are high paying crops in the dry regions. Rapeseed-mustard is a multiple use crop. Besides, its oil value, its seeds are also used as condiments in preparation of pickles and flavoring curries and vegetables. Oil and fat play a significant role in the human dietary system as well as the economy of the people. The oil is utilized for human consumption throughout India in cooking & frying. The leaves of young plants are used as a green vegetable as they supply enough sulfur minerals in the diet. The oil cakes are used as cattle feed & manures. Considering the importance of a rapeseed-mustard group of the crop in the Indian economy, the urgent need for undertaking the basic & strategic research for stabilizing and increasing the production & productivity of mustard in our country



Agricultural development is a complex problem. Therefore, reliable collection and sources of data are necessary for decision making and future planning. The study relies on secondary data compiled from various published sources. Data on the area, production and yield were collected from the Agricultural Statistics at a Glance from 2001 to 2015, Directorate of Economics and Statistics (DES), Ministry of Agriculture, GOI, Agriculture department of Yojana Bhawan, C-scheme, Jaipur. To analyze the changes in the area, production and yield of the mustard crop in Bharatpur region of Rajasthan, data were collected for the period from 2001-02 to 2014-15.[8,9]

Trends in Area, Production, and Yield of mustard crop Production of rapeseed and mustard has increased significantly in the country during the last few years. Trends are the drifts in data over long periods of time. “Gradual changes in the variable data over a long period and cause apparent increase or decrease in it that may not be detected in a year to year analysis.” (Goodwin, 1994) “Trend analysis uses time variable as a surrogate for capturing the effect of changes in other variables that either cannot be measured or in groups of Variables that change so gradually that collecting the information is not worth the effort.” (Tomek & Kenneth, 2003) The trend analysis not only depicts the past behavior pattern of the dependent variable but also provides forecast about its prospects. The trend analysis of the area, production and yield of the mustard crop for 15 years from 2001 to 2015 has been divided into seven sub periods starting from 2001-03 to 2013-15. There have shown considerable changes in the area, production and yield of the mustard crop in Bharatpur region of Rajasthan during this period.



In Bharatpur region of Rajasthan area under mustard crop increased from 5.31 lakh ha in 2001-03 to 8.66 lakh ha in 2005-07. During the year 2007-09 area under the crop declined and reached a level of 7.61 lakh ha but again increased from 2011 to 13. Area for the mustard crop in Bharatpur region is fluctuating. In all of five districts of Bharatpur region, the highest increasing trend in the area of the mustard crop can be seen in Sawai Madhopur which is 0.71 lakh ha in 2001-03 and by increasing reached at the level of 1.98 lakh ha during 2005-07. It decreased during 2007-09 and 2009-11 but again get the position of increasing, and in 2013-15 it became 0.83 lakh ha. Alwar and Bharatpur are the most important districts for the mustard crop regarding the area. In figure 1 red line is the trend line for the mustard crop in Bharatpur region which shows the increasing trends in the area for the mustard crop in Bharatpur region of Rajasthan.

Trends in production of mustard crop The production of mustard in Bharatpur region which was about 5.25 lakh tonnes in 2001-03 increased sharply and had doubled 11.85 lakh tones during 2009-11. However, there is some slightly declining position in mustard production during 2013-15. Lower production of mustard crop was due to lower sowing and fall in sowing was delay in monsoon arrival. Also delayed harvesting of kharif crops ensured a delayed sowing of Mustard crop. Higher temperature during sowing period also had an adverse impact on the sowing which directly affected the production of mustard crop. In all of five districts, Alwar and Bharatpur are the largest mustard producer districts of Bharatpur region[8]

IMPLICATIONS

Mustard has been the most profitable Rabi crop for farmers this year, as its prices have appreciated by nearly 40% since March. Cultivation interest, as a result, is expected to remain quite high for this season. So let us know key facts of Mustard cultivation and its economics. Mustard has been the most profitable Rabi crop for farmers this year, as its prices have appreciated by nearly 40% since March. Cultivation interest, as a result, is expected to remain quite high for this season.



So let us know the key aspects on Mustard cultivation as well as its economics. India ranks 4th amongst largest producer of oilseeds in the world with Rapeseed/mustard contributing near to 28.6% in total oilseeds production. Mustard oil is the crushed product from Mustard seed which is the third most important edible oils in the country after soybean and palm oil. Mustard seeds and its oil is used for culinary purpose and its younger leaves are often used in vegetable dishes. Mustard oil cake is another crushed product other than mustard oil, which finds use in feeding cattle. Varieties like brown and yellow Sarson, Raya and Toria crops come under the mustard rapeseed category. The different varieties are cultivated mainly in Rajasthan, Madhya Pradesh, UP, Haryana and Gujarat. The oilseed crop is also grown in few areas of south like Andhra Pradesh, Karnataka

and Tamil Nadu. Rajasthan contributes about 49% to the country's total mustard production, followed by UP(11%), Haryana (11%). Yellow sarson is considered as Rabi crop in Assam, Bihar, Orissa and West Bengal. On the other hand it is a catch crop in states of Punjab, Haryana, UP and Himachal Pradesh. Brown sarson was cultivated in most of the areas earlier, but in recent years the area under cultivation is reducing as it is getting replaced by Indian mustard. Brown sarson has two ecotypes Lotni and Toria. Toria is short duration crop sown under irrigated condition. Gobhi sarson is new emerging oilseed, it is long duration crop grown in Haryana, Punjab, and Himachal Pradesh. In India nearly 98-99% of the cultivated area comprises hybrid seeds and only 1-2% of the cropped area is allocated for the normal varieties. [7,8]

Soil Requirement

Light to heavy soil is good for mustard and rapeseed cultivation.

Raya can be grown in all type of soil whereas loam to heavy soils is suitable for toria crop.

Sandy and loamy sand soils are suitable for Taramira crops.

Land Preparation

Fine seed beds are required for good germination of crop.

Ploughing of soil should be done for two to three times followed by two harrowing.

Planking should be done after every ploughing.

Prepared firm, moist and uniform seed bed as it will help in uniform germination of seed.

Sowing

Ideal time for sowing Mustard crop is from September to October.

Toria crop is normally sown between first fortnight of September and October.

The Taramira crop can be sown during the entire October month.

Raya crop is done between Mid of October to End of November.

Spacing

For rapeseed:- Row to Row distance of 30 cm and plant to plant distance of 10-15 cm.

For Gobhi sarson:- Row to Row distance of 45 cm and plant to plant distance of 10 cm.

Depth

Depth should be kept at 4 to 5 cm.

Method of sowing

Using seed drill is recommended

Seed Rate

Rapeseed:- seed rate of 1.5 kg seeds per acre.

Thinning operations must be done three week after sowing and maintain only healthy seedlings.

Seed Treatment

Before sowing seed treatment to be done with Thiram at 3gm per kg of seeds.

RESULTS

Fertilizer Application (Kg/Acre)

Crop	UREA	SSP	MURIATE OF POTASH
Toria	55	50	On Soil Test Results
Raya & Gobhi Sarson	90	75	10

Ensure the following during field preparation,

Apply 70 to 100 qtl farm yard manure or well decomposed cow dung in soil.

For accurate fertilizer dose, soil testing is necessary.

For toria crop, apply Nitrogen: Phosphorus in ratio of 25:8 kg/acre in form of Urea at 55kg/acre and Super phosphate at 50kg/acre.

Apply Potash dose only when soil show deficiency of it.

For raya and gobhi sarson, apply N:P:K in ratio of 40:12:6 kg/acre in form of Urea at 90kg, SSP at 75kg and MOP at 10kg per acre.

For rainfed raya crop apply Urea at 33kg/acre and Super Phosphate at 50kg/acre.

Apply Urea just before pre-sowing irrigation.

Weed Control

Weed control in Toria crop, do pre-plant incorporation of Trifluralin at 400ml/200Ltrs of water per acre.

For raya crop, give pre-emergence spray of Isoproturon at 400gm/200Ltr within 2 days of sowing.

Irrigation

Pre-sowing irrigation should be done before sowing of seeds.

For getting good growth, crop required in general about three irrigation apply at interval of three weeks after sowing.

Good amount of organic manures should be applied in the soil, it will result in conserving moisture in soil.

Harvesting

Depending variety crop takes 110 to 140 days to mature.

Harvest to be done when pods turn yellow and seed become hard then harvest crop.

Harvesting to be carried in morning hours to avoid shattering loss.

Cut crops close to ground with the help of sickle.

Stack the harvested crops for 7-10 days.

Complete threshing operation after proper drying .

Post-Harvest Activity

Seed should be well cleaned and then it must be dried in the sun for 4-5 days.

When the seed gets dried properly then stored seeds in gunny bags or bin.

Popular Varieties Sown

Toria Varieties

PBT 37: Early maturity variety, and matures in 91 days. Suitable for toria-wheat cultivation. Gives average yield of 5.4 qtl/acre and seeds contains 41.7% oil.

TL 15: It is early maturity variety, requiring 88 days to mature and gives average yield of 4.5 qtl/acre.

TL 17: Harvesting can be done after 90 days. Suitable for multiple cropping. It gives average yield of 5.2 qtl/acre.

Raya

RLM 619: For cultivation in irrigated and rainfed area and gets ready for harvest in 143 days. Contains 43% oil. It is resistive to white rust, blight and downy mildew and average yield is 8 qtl/acre.

PBR 91: Can be harvested in 145 days. It show resistant to blight, rust and insect pest and gives average yield of 8.1 quintal/acre.

PBR 97: Suitable for cultivation under rainfed condition. Can be harvested in 136 days. Grains medium bold with 39.8% oil content. Gives average yield of 5.2 qtl/acre.

PBR 210: Suitable for timely sown and irrigated condition. Gets ready for harvest in 150 days. Average yield is 6 qtl/acre.

RLC 3: Tall variety, and ready for harvest in 145 days. Its average yield is about 7.3 qtl/acre. Its oil content 41.5%.

Gobhi Sarson

GSL 1: Ready to be harvested in 160 days. The crop gives average yield of 6.7 qtl/acre. Seeds contain 44.5% oil content.

PGSH51: Takes 162 days after sowing, for harvesting to begin. Tall and high yielding hybrid and gives average yield of 7.9 qtl/acre. Seeds contain 44.5% oil content.

Gobhi sarson (canola type): The oil of canola variety is good for human health.

Hyola PAC 401: It is medium heighted crop and matures in 150 days. Seeds are brownish black and contain about 42% oil. The average yield is 6.74 qtl/acre.

GSC 6: Recommended for timely sown crop under irrigated condition. Seeds are bold with 39.1% oil content, and gives average yield of 6.07 qtl/acre.

Indian Mustard

RH 0749: Suitable for cultivating in northern states of Haryana, Punjab, Delhi, Jammu and North Rajasthan. A yielding variety having more number of seeds per silique. Gets ready to harvest in 146-148 days. Seeds are bold and having oil percentage of 40%. It gives average yield of 10.5-11 qtl/acre.

RH 0406: Grown in rainfed areas. Ready to be harvested in 142-145 days. Average yield is 8.8 - 9.2 qtl/acre.

T 59 (Varuna): Suitable for growing under all climatic conditions. Gets Ready for harvest in 145-150 days and oil content is roughly 39%. Gives average yield of 6-8 qtl/acre.

Mustard Varieties of Private Companies

Pioneer 45S42: High yielding variety with medium maturity. Matures in 125-130 days for harvesting. Suitable under all soil conditions. Its grains are bold and high pod density. It give average yield is 12.5 qtl per acre.

Pioneer 45S35: High yielding and early maturing variety. It give average yield is 12.5 qtl per acre.

Pioneer 45S46: High yielding and medium duration variety. Grains are bold with good oil percentage. The average yield is 12.5 qtl per acre.

Other States Varieties

Pusa Agrani: Suitable for early and late sown areas, under irrigated conditions. Becomes ready to harvest in 110 days. The average seed yield is 7.2 qtl/acre with oil 40% oil content.

Pusa Mustard 21: Suitable for timely sown irrigated areas. Gives average yield of 7.2-8.4 qtl/acre.

Pusa Mustard 24: Suitable for timely sown irrigated areas and average yield is 8-10 qtl/acre.

NPJ 112: Suitable for early sown areas with average yield of 6 qtl/acre.

Pusa Mustard 26: Suitable for late sown areas. Is Ready for harvest in 126 days. Gives average yield of 6.4 qtl/acre.

Pusa Mustard 28: Harvest possible in 107 days. Productivity is high compared to other variety. Oil content is near to 41.5%. [8]

CONCLUSIONS

Economics of Mustard Cultivation

It takes 2-2.5 Kgs of Hybrid seeds to be cultivated in one acre. On an average the yield per acre is 6-8 quintals. Average crop duration of these seeds is 120-

125 days approximately. In India nearly 98-99% of the cultivated area comprises hybrid seeds. Therefore we shall consider the various cost incurred in planting with the Hybrid seeds.

Hybrid varieties grown for commercial purpose are

1. Pusa Agrani
2. Varuna
3. Pusa Mahak
4. Narendra Agethi
5. 45 S 42
6. 45 S 46
7. Shredda
8. Koral 432

Cost of Cultivation For 1 Acre Land

Land Preparation Cost: Ploughing through tractor is done during field preparation. Average Tractor charge to plough one acre land is Rs 1000. One labour is enough per acre for field preparation and cost of one labour is Rs.200.

Cost of Seed: Quality seeds to be purchased for ensuring good returns. Seed rate to cultivate one acre is 2-2.5 kgs. Cost of 1 Kg of quality seeds is Rs.200. Thus cost of purchasing seed per acre is Rs.500.

Planting Cost: 2 Laborers are normally sufficient to do the planting on an acre of land. Therefore planting cost amounts to Rs 400.

Fertilizer and Weeding Cost: Mustard can be grown with lower use of manure and fertilizer quantities thereby lowering the overall cost. For one acre land fertilizer application cost is Rs.1200 and cost of using manure is Rs.800.

In context to weeding cost, the charges for inter cultivation is Rs. 500 while cost of spraying herbicides is Rs.600.

Protection Cost for Mustard Crop: Plant protection measures i.e. protecting against Saw Fly and Saw Dust totals nearly Rs.750-800 per acre.

Miscellaneous Cost: Includes expenses on Family labor, land rent, interest on capital, Farm Machinery Depreciation cost, electricity charges etc. for an acre Land. These costs work out to be close to Rs.1175-1200.

Mustard Harvesting Cost Harvesting is normally done after 120-130 days of sowing. 2 Laborers are required to harvest mustard crop in an acre, with the help of sickles. Then, after the harvesting, two laborers are again required to separate the seeds through winnowing etc. Total cost mounts to Rs.800 therefore.

Transportation Cost: Final cost is incurred over transporting the produce to nearby market for selling, which is around Rs.250-300.

Computation of mustard production cost:

We now compute the net expenses incurred on farming in one acre land. On an average mustard yield per acre is 5-6 quintals. But high yielding varieties and better agronomic practices can increase the yield to 6-8 quintals per acre.

Costs Incurred For	Rs/Acre
Land Preparation	1200
Seed Purchases	500
Sowing	400
Fertilizers and Manure application	2000 (1200+800)
Plant Protection	800
Miscellaneous Activities	1200
Weeding	1150 (500+650)
Harvesting	400
Drying and Threshing	800
Transportation Cost	300

Therefore Total Cost equals to Rs8750 per acre approximately. It is advisable to add at least 10% of total cost, considering other factors, like post-harvest losses etc. Therefore Net cost comes early Rs. 9625/acre approximately.

As on September 4, 2020 the average grades of Mustard were being traded around Rs.5000-5500. Taking Rs.5200/qlt as the average market price, net realization for selling 6 quintals (taking minimum possible yield per acre) will be Rs.31200.

Therefore farming of mustard in acre of land shall generate net profit of Rs.22000 (approximately). [9]

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